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FOR

**CLOTHING AND MODEL IMAGE GENERATION, COMBINATION,
DISPLAY, AND SELECTION**

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CLOTHING AND MODEL IMAGE GENERATION, COMBINATION, DISPLAY, AND SELECTION

BACKGROUND

Field

[0001] Embodiments of the invention relate to arranging of clothing items on mannequins to obtain a photoimages of the items of clothing, and automated-assisted shopping to allow a shopper to see a composite photoimage the photoimage of clothing as if worn by a person having physical measurements the same as or close to those of the shopper.

Background

[0002] Various apparatus, systems and methods have been proposed to enable shoppers to shop over the internet or another remote telecommunications system.

[0003] U.S. patent number 5,930,769 discloses a method of fashion shopping in which a customer's personal information including body measurements is entered and from which the system designates a body type and fashion category which then allows the customer to access modeled presentations of various clothes that are within the designated body type and fashion category. The correct garment size is calculated. Fashion data is provided to the customer which may include merchandise photographs or display of a model having the customer's body type wearing the selected fashion. Since different garment manufacturers have different sizing systems a garment size for a selected garment by the particular manufacturer is selected from the customer's measurements. From the customer's measurements a size is selected and the computer generates a virtual mannequin. Although an image of the clothing is shown, the system does not propose an as-worn image. The clothing and models are computer generated and are not real. The material shown is interpreted by computer animation. There are no actual photos. The reality of the actual fit is not conveyed because of the animated alterations.

[0004] U.S. patent number 6,307,568 discloses a system and method for on line shopping in which a picture of a user is displayed as digital image. A

set of critical points is taken from the user's image. These are used to alter an image of a selected garment to establish an altered spatial configuration of the garment. Then an altered composite image is formed in which the altered spatial configuration of the garment is dressed on the image of the user. In this method the spatial configuration of the clothing alone is determined and adjusted to fit the body of each shopper. However the spatial configuration is only an image of a selected size image altered according to the set of critical points. Computer graphic alterations give an unrealistic view of the clothing's actual fit.

[0005] U.S. patent number 4,261,012 discloses a system that records the head and neck of a consumer and records articles of clothing on a model, but only from the neck down. Although the consumer and the model may differ in size the image of the consumer's head and neck and of the model with the clothing item on can be adjusted by a special effects generator to make a composite image. It does not address the problem of showing the garment as it would look on the consumer. The item is never actually seen as-worn.

SUMMARY OF THE INVENTION

[0006] Embodiments of the invention relate the arranging items of appropriately sized clothing on the mannequins having portions with different sizes and transitional members joining the portions with an outer surface transition so that the items of clothing appear in photoimages as if worn people having portions similar to those of the mannequins.

[0007] In another aspect, embodiments of the invention relate to apparatus, systems, and method for shopping using a display that will show the as-worn photoimages of the clothing items in a composite with a photoimage of a model whose dimensions are the same as or close to those of the mannequin on which the as-worn photoimage was taken. Thus, a shopper can select a mannequin whose physical dimensions correspond to that of the shopper or another person and can appreciate how the clothing item will look on a person having those physical dimensions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Embodiments are illustrated by way of example and not by way of limitation in the figures of the accompanying drawings in which like references indicate similar elements. It should be noted that references to "an" embodiment in this disclosure are not necessarily to the same embodiment, and they mean at least one.

[0009] **Figure 1** is a block diagram of a system to display as-worn clothing.

[0010] **Figure 2** show a cubical for taking model photoimages and mannequin photoimages.

[0011] **Figure 3** shows a carousel for creating model photoimages and mannequin photoimages.

[0012] **Figure 4** shows the parts of a mannequin.

[0013] **Figure 5** is a flow chart of a process for a user or shopper to use the system and access displays of as-worn clothing.

[0014] **Figure 6** shows a screen to display to a user or shopper a fitting room interface to selecting clothing items to be displayed as-worn, and to view composite clothing images.

DETAILED DESCRIPTION

[0015] In general the goal of the present invention is to give a shopper who shops over the Internet or an other remote telecommunication system a more accurate image of how clothing items will look on a person and also to increase the likelihood that the shopper or person will want to keep an article of clothing that is purchased by way of a remote purchasing system. For example, a more accurate image of clothing items as they will look on an actual

person may be provided to the shopper with a high quality photoimage of the items as if worn on an actual model of the same body size and configuration as the person. This includes having a high quality photoimage of the clothing arranged on a mannequin that closely replicates the person's physical dimensions and a good image of a model that also closely replicates the person's physical dimensions. Then, the photoimage of the clothing arranged on a mannequin may be combined with sections of the good image of the model to display the clothing fitted as if worn by a model of the person's physical dimensions.

[0016] In the following description it is appreciated that commonly a particular fashion design will be available in a range of sizes (e.g., clothing sizes) each one of which is a clothing item. Typical clothing shopping includes the shopper trying on clothing items within the size range of a particular fashion design to see which is the right fit and more generally how the clothing item looks as worn on the shopper.

[0017] Embodiments of the invention aid shopping by allowing a shopper to view clothing on a display that receives imagery from a computer. For example, a computerized shopping system, whether accessed on-line from a remote location or accessed while in a clothing store, may present the shopper with a high quality as-worn photoimage of a clothing item as it would look on the shopper by displaying the clothing on a mannequin having clothing sizes that are the same as those of the shopper. Also, the system may show a composite of the clothing displayed on the mannequin with a photoimage of a model. A real model image or photoimage enhances the sense of realistic presentation. Thus, the presentation may display composite images in which model images or photoimages appear to be wearing clothing of varying sizes that are the as-worn photoimages of the clothing items worn by mannequins having portions appropriately sized to match the shopper. For example, such a mannequin may be assembled from two or more mannequin portions or sections having different physical dimensions corresponding to different clothing sizes and be dressed with clothing items having those different sizes to provide an accurate representation of what the clothes would look like as if worn by a person having those physical dimensions.

[0018] Thus, the system can aid shopping outlets, by providing on site displays to the shopper for sellers to obtain business through purchasing by the shopper assisted by the aided shopping system. In particular with presentation of an as-worn photoimage on-line or in store shoppers can make better choices which results in happier customers and fewer returns. In the present description the term "aided shopping" includes where a shopper is interactively connected with an apparatus or system, and through a method, in which the shopper has a display and can view clothing items offered for sale. Also in the term "aided selling" may include a business method for selling clothing through aided shopping. Embodiments, of the present invention in one aspect include a system and method for remote aided shopping for clothing, such as remote aided shopping via the internet. The system and method can also be employed in a store.

[0019] Specifically, embodiments the invention allow the user or shopper to see how selected clothing will look in an as-worn display that closely replicates the user or shopper's own clothing fit (or that of another person for whom the user or shopper is shopping). This may be achieved by creating a photoimage catalogue of clothing in one or more fashion designs in which each clothing item has been dressed on a mannequin whose size is appropriate for the size of the clothing item and a series of photoimages obtained over the size range of the fashion design. The shopper can then see a display of the as-worn photoimage in a size desired by the shopper. It may also be desirable to fit and photograph items of clothing that are one or more sizes up and/or one or more sizes down from the clothing item size of the mannequin so that a shopper can see as as-worn photoimage including undersized or oversized clothing on that sized mannequin. For instance, embodiments of the invention present an as-worn photoimage of a clothing items arranged on a mannequin superimposed on a model image or photoimage that also has or includes a portion having the selected fit dimensions. Thus, a user or shopper may be able to view as-worn photoimages of clothing having the same size as, sizes smaller than, an sizes larger than the sizes corresponding to portions of a mannequin with physical dimensions similar to the shopper or another person. Note that, as used

herein, a "photoimage" may be a photograph (e.g., such as a digital photograph, a frame or rendering from a digital video, a digital version of an actual photograph, or a photoimage as described further below) to provide a detailed, natural, and accurate rendering of the subject matter of the photoimage. Similarly, an "image" as used herein, may be or include a photoimage, a morphed image, a virtual rendering, an image processed photoimage or image, a combined image or photoimage, and/or other digital image renderings or processed images, such as described further below.

[0020] Figure 1 is a block diagram of a system to display as-worn clothing. The system has three parts or portions. One part, which can be called service provider portion 10, may reside or be located with a service provider. A second part, which can be called user or shopper portion 12, may reside with or otherwise be available to one or more system users or shoppers. A third part which can be called seller portion 14 may reside with one or more clothing sellers. The term "reside" does not necessarily mean that the portion is all physically co-located, but of course it may be.

[0021] Service provider portion 10 is shown having memory 16, processor 18 and communications element 20. As a practical matter, portion 10 would likely also have display 22, although display is not an essential element of its operation. Service provider portion 10 could be implemented by a commercially available personal computer (PC) or equivalent and may include a server in order to accommodate the operating and application software as well as various databases, such as a database of customer (e.g., user or shopper) records, image databases, and photoimage databases. User or shopper portion 12 is shown having computer 24, such as a commercially available consumer PC or equivalent, display 26, keyboard 28, as well as communications element 30. Sellers portion is shown 14 having communication element 32, ordering element 34 to receive orders to purchase clothing items, and fulfillment element 36 to fill and/or ship clothing items purchased. Communications elements 20, 30, and 32 may be part of and/or communicate via a telecommunication link, the Internet accessible modem or computer interface, a network interface, a wireless communication interface, or

any other suitable digital or analog communication link. The communication and interaction between these parts will be described.

[0022] Figure 1 also shows communications elements 20, 30, and 32 coupled to communication medium 38. Thus, communications elements 20, 30, and 32 may establish and maintain communication between service provider portion 10, shopper portion 12, and/or seller portion 14, via communications medium 38. For example, communication medium 38 may be an intranet, the Internet, a network, a telephone communications link, a wireless link, or another appropriate medium for communicating analog or digital signals coupled to communications elements 20, 30, and 32. Thus, in embodiments, communication element 32 may establish and maintain communication with the shopper, an ordering element 34 operative to receive and confirm orders and a fulfillment element 36 operative to direct the filling and shipment of orders (or schedule orders for pick-up by the shopper).

[0023] Moreover, embodiments may allow customer, image, and photoimage databases to be transferred to seller portion 14 or servers so that the shopper and the seller are in direct communication, without the system provider, such as for the trying-on clothing portion of the process. The system provider may still be in communication for the process of user/shopper signing on and confirmation of the shopper physical measurements, and then pass the operation by medium 38 link to the seller portion 14. In addition, according to embodiments, all or any of service provider portion 10, shopper portion 12, and/or seller portion 14 or the functionality of components thereof may reside within any one or more of those portions, such as by residing within a single computer at seller portion 14 or user/shopper portion 12.

[0024] Before the system is used by users or shoppers a set of databases may be created including a database having physical information related to clothing size for customer or other people, a model image database, and an as-worn clothing photoimage databases. For instance, the model image database may be a part of service provider portion 10 and may reside in memory element 16 accessible to processor 18. This database may include a series of images or photoimages of unclothed human models (preferably the models

will wear body suits or a simple garment suitable for displaying the photoimage to the public at large) representing as many different combinations of body measurements sizes and clothing sizes as are desired to be in the system.

[0025] In one procedure, creation of the model database begins with selection of a group of models such as 50-100 models for groups of men, women, and children, such as according to sizes (e.g., such as clothing size, maternity size, measurements of body portions relating to clothing size as explained below). Next each model may be photographed with garments to cover areas that the clothing items from the as-worn database will cover. The photography may be done in or converted to digital form for storing, recording, or loading into a computer memory or database. For instance, digital photographs may be taken to facilitate storing or loading into and use by service provider portion 10. Alternatively, digital data may be scanned from film photos, slides, and video images.

[0026] Consequently, according to embodiment, a model image or photoimage database may be created that include images, such as photoimages of models having features, outer surface dimensions, or physical dimensions that are relevant to clothing fit, equal or are related to a clothing size of an item or clothing. Specifically, such features or portions may include indicia, physical data, physical dimensions, or measurements of around the top of a person's neck, around a person's neck, across a person's shoulders, a center front ("CF") from a person's neck to waist, a bust, a bust point to bust point, a center back neck-to-waist, a center back neck-to-bust point, a waist, a high hip, a low hip, a fullest hip (e.g., down sideseam), a thigh (e.g., below crotch), a mid-thigh (e.g., down sideseam), a torso rise (e.g., CF waist to center back ("CB") waist), a knee (e.g., down sideseam), a calf (e.g., down sideseam), an outseam (e.g., sideseam waist to ankle), an ankle (e.g., down), and a cutoff length for women and/or men. It may be appreciated that certain of the features or portions mentioned above may be more applicable to women or men. For example, it is considered that the model image database may include images or photoimages of different combinations of women's height, weight,

inseam, waist, hips, and bra measurements; and for men, height, weight, waist, inseam, shirt, neck, and shoulders measurements, and bottom.

[0027] In addition to a large variety of different model images or photoimages, in one embodiment, the data is stored or later transformed so that portions of the model photoimages (e.g., such as upper body and lower body photoimages) can be separated and selectively combined thereby increasing greatly the number of varied body configurations that can be made available. For example, different model photoimages may be combined, or a model image database may include combinations of features or portions described above such as via digital image or digital photograph image processing, morphing, overlaying, cutting or separating and combining, image subtraction or addition, or various other processes for processing or combining photoimages, photoimage renderings, and virtual images. Thus, women models can be photographed in sizes 0-14; a set of model sizes can be photographed in size groups such as teens, petite, misses, etc and similarly for men and children's lines of clothing. Also, in addition to standard size designations the model database can also encompass dimensions that are present in clothing sizes such as bust, weight, height, inseam and thigh sizes, etc. Male models can be similarly photographed; for example from waist sizes 26" to 44" with combinations of leg length and inseam for pants and arm lengths for shirts and jackets and neck size for shirts, etc. Needless to say the model image database can be initially established in the most common sizes and dimensions and eventually expanded to include other sizes and dimensions.

[0028] A process for creating the model image database may begin with taking a series of still images, such as in digital format, or in a digital video, from rotational positions around the model. The images may be eventually presented to a shopper starting with a frontal photoimage with the option of rotating the image. Where still photos have been taken such as front, sides and back, the rotation will go from the initial front view to the next of these images (front, to side, to back, to other side return to front). It is also contemplated that image processing technology (e.g., such as based on computer instructions or software) may be used to generate rotational views in addition to those for

which there is an image. Where a video has been taken the rotation can be programmed to display fine degrees of change depending on the user's selection such as rapidly clicking a mouse for very small changes or slower clicking for greater changes or holding down the mouse switch for continuous movement. The process of acquiring, storing and allowing access to display the photoimages will be executed to enable that use through programming in the computer. Thus, the model photoimages or images may be image processed or combined as described above, or may be digitized from hardcopies, and may be stored in the memory element 16.

[0029] In addition, a model image database may include or be combined with another database (e.g., such as a separate or separately located database) to form model image database renderings, virtual images, photoimages of models (e.g., such as described above with respect to the model image database), still images, digital video segments, digital video images, or other virtual or photoimages of portions of a person or model that may or may not be covered by clothing. For example, the model image database, or another database using images from the model database, may include or combine (e.g., such as by separating and combining, overlaying, image processing, and/or morphing) features or portions, or data describing or defining skin color, skin tone, hair color, hair tone, eye color, eye tone, eyebrow color, eyebrow tone, hair type (e.g., such as curly, wavy, straight, etc.), hair style, hair shape, head size, ear shape, ear size, eyebrow shape, neck, shape, face shape, cheek shape, nose shape, chin shape, eye shape, skin texture, freckles, blush, etc. . . . Furthermore, such database may include hand shape, hand size, finger shape, finger size, fingernail shape, fingernail size, fingernail color, foot shape, foot size, toe shape, toe size, toenail color, toenail length, toenail shape, arm shape, arm size, arm length, leg shape, leg size, leg length, etc. . . . Thus, according to embodiments, such a database may include data or photoimages for such features and/or may include data or images of such features or portions combined.

[0030] **Figure 2** shows a cubical for taking model photoimages and mannequin photoimages. For example, **Figure 2** shows cubicle 42 having background 41 and mount 44 (e.g., such as a floor space for standing or

mounting a model or mannequin onto). Thus, cubicle 42 provides mount 44 on which various models and/or mannequins may be positioned or mounted in a pose and wearing no or some clothing arranged on the model or mannequin in an as-worn fit.

[0031] Further, mount 44 may provide a number of rotational positions to rotate the model or mannequin positioned on mount 42 to various orientations with respect to background 41. For example, mount 44 may have an axis and a mechanism allowing the mount to rotate with respect to the axis to a plurality of rotational positions, such as in direction rotation P to rotate orientation arrow OA to rotational position P1, P2, P3, and P4. Thus, a model or a mannequin wearing clothing items arranged in an as-worn fit may be posed in a particular pose on mount 44 and a photograph taken. Then mount 44 may be rotated to photograph the model or mannequin from a different orientation with respect to background 41 while the model or mannequin holds or is maintained in the initial pose and wears the clothing in the original as-worn fit. It can be appreciated that the result of taking photoimages of the pose from various orientations may be used to assemble three-dimensional images of the mannequins wearing clothing having a clothing size corresponding to the clothing size of the portion of the mannequin as if the clothing were worn by a model wearing the clothing size that corresponded to the clothing size of that portion of the model. In fact, the fit described above may be one definition of the term "as-worn" as used herein.

[0032] Again, referring to **Figure 2**, in order to ensure uniformity of model or mannequin poses and/or as-worn clothing photoimages, each model or mannequin 40 may be placed in a cubical 42. The cubical 42 may be a walled structure including background 41, such as a curved wall, presenting a neutral background for photography. The neutral background may be a shaped hard, screen, textured, or other surface such as having a curve, semicircular, or planar top perspective shape to form a color screen or neutral background such as a "blue screen" on which images may be subsequently superimposed or a background may be laid over (e.g., such as in an image processing process). Moreover, background 41 may also provide or be selected to block out undesired background or background images. The purpose of the cubicle 42

includes standardizing the photography of and the pose of each model or mannequin 40.

[0033] The cubical 42 may also provide a neutral and invariant background and have location indicia in order that each model or mannequin 40 will take the same pose. On the wall of the cubical 42, hand position indicators can be placed. Fixtures may be used to provide location indicia to assist positioning the models. Location indicia for foot positioning can be markings placed on the floor. Other location aids or mannequin attachment or restraining devices can be employed as location indicia. Of course between models mannequins of considerable different sizes, the location indicia may vary. This may be necessary where the difference is between adult and children for example; but within a narrow sizing category such as men or children the location indicia should be the same or allowed to vary in a predetermined range.

[0034] According to embodiments, mount 44 on which the model 40 will stand can be a rotatable platform so that the model or mannequin 40 will rotate to the sequential positions, either for discrete still shots or continuous video, without changing the pose and/or fitting the clothing. Once model or mannequin 40 is in position, the mount 44 can rotate for the photography. In other words, cubical 42 may ensure that there is no change to the pose or background for a model or mannequin during photography thereof, as described above.

[0035] It is contemplated that photoimages of models, mannequins, clothing in as-worn fittings, head and face features, feet, and other photoimages described herein may be photoimages acquired such as by a standard film camera (e.g., such as by scanning an image from a standard camera into digital format), a digital still camera (e.g., such as having a resolution between one million pixels and ten million pixels), a digital video camera, or other technology capable of scanning in or converting images into digital media such as to be stored in the memory of a computer. For instance, a model or mannequin may be placed on mount 44 and digital video or video for conversion to digital format may be taken over a time period such as a time

between a still image and 10 seconds, while the model or mannequin is maintained in a pose and/or while mount 44 is rotated as described above. In particular, digital video images may be taken of a mannequin or model on mount 44 over a 3-5 second period while the mount is rotated through a complete rotation to give a 360° set of video images for the model or mannequin.

[0036] In fact, it is considered that models and/or mannequins may be prepared and/or photographed in more than one cubical at once. More particularly, **Figure 3** shows a carousel for creating model photoimages and mannequin photoimages. Specifically, creating the model and/or as-worn photoimages may be done at working positions 52a, 52b, 52c and 52d of carousel 50 of **Figure 3**. Associated with or corresponding to each of working positions 52a, 52b, 52c and 52d, **Figure 3** shows rotating floors 54a, 54b, 54c and 54d, and models/mannequins 53a, 53c and 53d. The carousel 50 can be a rotating device, such as by rotating in a direction as indicated by rotation arrow A. It is to be appreciated that carousel 50 may rotate in the direction opposite that shown by rotation A. For instance, carousel 50 may be a generally planar surface having an axis at its center and a mechanism, such as a bearing, to allow the surface to rotate with respect to the axis, such as in direction rotation A. In addition, carousel 50 may have one or more cubicles, such as by having a cubicle as described above with respect to cubicle 42, at each working positions 52a, 52b, 52c and 52d. it is to be appreciated that carousel 50 may have more or less than 4 working positions, such as by having two or more working positions.

[0037] Each of the working positions 52a-d may have corresponding rotating floor 54a-d, such as provided by a cubicle (e.g., such as cubicle 42, but not completely shown in **Figure 3**). Thus, each rotating floor 54a-d may be a mount or floor such as mount 44 described above for cubical 42. Cubicles and/or rotating floors at working positions 52a-d can be readily dismountable or detachable from carousel 50 so that for or during some operations or processes where or when cubicles and/or rotating floors are not needed, they may be taken away from working positions.

[0038] During photographing or photography setup, rotating floors 54a-d may rotate to positions or orientations with respect to the position of a camera. It can be appreciated that one or more cameras can be used to photograph one or more models/mannequins at one or more of working positions 54a-d (e.g., during different times or simultaneously).

[0039] Thus, in situations where one camera is used, that camera may be fixed at a position with respect to carousel 50 and carousel 50 may be rotated so that each of the working positions may be located adjacent to the camera and photographed in turn. Alternatively, a single camera may be moved in position with respect to the positions adjacent to each of the working positions, such as by being mounted on a dolly, to photograph models or mannequins thereon. Moreover, the same process described above may be performed with more than one camera. Also, photoimages of models or mannequins can be taken using carousel 50 without rotating carousel 50. For example, it is contemplated that carousel 50 need not rotate while one or more cameras orientated at one or more positions with respect to one or more of the working positions takes photoimages of one or more models or mannequins at the working positions. In any of the processes described above, the any or all models or mannequins can be rotated between or during photography at the working positions. It may be appreciated that any combination of rotating the carousel and/or moving the camera as described may be combined.

[0040] Furthermore, use of carousel 50 allows models or mannequins at certain working positions to be worked on, dressed, posed, or otherwise prepared while models or mannequins at one or more other positions are being photographed. For example, taking four models/mannequins at a time in the working positions 52a-d with the cubicles and location indicia will ensure that each model will be photographed in the exact same pose and it will help reduce the time that it will take to photograph the whole model group. It will also enable easy match of each corresponding mannequin with its model match as will be described later. Of course less than four models/mannequins at a time may be taken at the working positions 52a-d. Specifically, **Figure 3** shows no model/mannequin at working position 52b.

[0041] Thus, carousel 50 can provide an assembly line model and/or mannequin dressing and photography procedure. For example, at position 52a, the carousel and the procedure may allow a mannequin upper and lower portion will be assembled, the carousel to be rotated; the clothing item or items to be dressed onto the assembled mannequin at position 52b; any additional mannequin or clothing arrangements or adjustments can be made and final quality check-out to ensure that the mannequin is in the exact position as the corresponding model photoimage at position 52c; then, the photography can be taken at position 52d.

[0042] Also, according to embodiments, a cast or mold of each model's body may be used to create a mannequin representing that model, such as to create a mannequin collection on which to shoot the as-worn clothing item photoimages. This may be done by casting a mold, such as with plaster, of each model and from the mold creating a reproduction of the model as a mannequin. It is to be appreciated that a mannequin as described herein may be formed of various materials including silicone, plastic, rubber, polymer, copolymer, foam, soft foam, materials appropriate for injection molding, materials appropriate for shaping by an automated process, plaster, plaster cast, and/or various other appropriate materials.

[0043] In addition, according to embodiments, mannequins may be formed by manual and/or automated processes the involve data obtained during or from taking photoimages of the models as described above with respect to **Figures 2 and 3**. For instance, digital video taken of a model on mount 44 or rotating floors 54a-d, while they are rotated, may be used to machine a "clone" of the model from a material described above (e.g., such as by shaping of soft foam to form a soft foam mannequin or shaping of a mold or shape from which to form a mold). It is considered that mannequins can be made of fiberglass poured into the plaster mold or as a soft mannequin made of foam plastic material.

[0044] After the mannequin is created it may be separated into two or more portions. For example, a mannequin may be separated into features or portions as described above with respect to features or portions of models to be

combined. Thus, the mannequins formed above may be cut in half, into a top and bottom piece. Specifically, in one embodiment, mannequins will be divided at approximately the waist so as to enable creating size combinations of upper and lower body portions.

[0045] For instance, **Figure 4** shows mannequin 60 having upper portion 62, and lower portion 64. As a result, an original full body mannequin may be formed consisting of the original upper and lower portions matching the original full body of each model. Moreover, various portions of original mannequins corresponding to the models (e.g., such as the original upper and lower portions) may be combined, such as to match combinations of portions of models used to form model images in the model image database, as described above. Hence, it is possible to assemble a mannequin corresponding to each of the images in the model image database. In fact, by producing enough mannequins it is possible to create a mannequin that corresponds to each image in the model image database.

[0046] Since sizes of the portions of models and mannequins may not exactly correspond, a device may be used to attach the portions that transitions the size difference. For instance, according to embodiments, a transition member may have a first side to couple to a mannequin first portion, such as a portion having a first clothing size outer surface dimension, and a second side to couple to a mannequin second portion, such as a portion having a second clothing size outer surface dimension.

[0047] More particularly, as shown in **Figure 4**, model upper portion 62 and lower portion 64 may be combined with transition member 66 having a smooth or transitional outer surface to compensate for any difference in outer surface dimension between the portions. When non-original mannequin upper and lower portions are to be matched a transition member 66 may provide a seamless fit between the size discrepancy of the mannequin upper and lower portions. For example, it is contemplated that the upper portion clothing size outer surface dimension of a mannequin may be different than the lower portion clothing size outer surface dimension. Transitional member 66 includes transitional outer surface 69 disposed between the first side to couple

to upper portion 62 and the second side to couple to lower portion 64, where transitional outer surface 69 provides an outer surface transition between the outer surface shape of upper portion 62 and lower portion 64. For example, transitional outer surface 69 may include various surface shapes such as a linear shape, a curved shape, a smooth shape, and a graded shape surface. **Figure 4** also shows transition member 66 having a thickness T such as a thickness between 1/2-5 inches. Specifically, thickness T may be a thickness of 1 inch, 1 1/2 inches, 2 inches, 2 1/2 inches, or various other appropriate thicknesses over which to provide a sufficient transition for transitional outer surface 69 to have a dimension to form an outer surface transition between the outer surface of upper portion 62 and lower portion 64.

[0048] Next, **Figure 4** shows, mounting spines 68 and 70 extending upwardly and downwardly respectively from the transition member will fit into matching receptacles or cavities in the mannequin upper and lower portions. It may be appreciated that a coupling arrangement with spines 68 and 70, but without member 66; or a transitional member without spines 68 and/or 70, may be used to mate the upper and lower portions. Thus, transitional member 66 may be used to form a full body mannequin consisting of an upper portion, transitional outer surface, and lower portions matching the portions of a model image and to dress up that model with clothing such that a photoimagery of the mannequin corresponds in shape to the model image.

[0049] According to embodiments, a number of transition members may be used to account for all the various sizes of upper portion as compared to the various sizes of lower portions. Likewise, transitional members may be used to join other portions of mannequins described herein. As a result, it is possible to form a full body mannequin with a smooth, a linear, a curved, a graded, and/or a natural transition between portions of the mannequin.

[0050] Now, relating the previous discussion of taking photoimages of mannequins to mannequins with different sized portions dressed with clothing items. There may also be a fitting on the mannequins that has a mating member on the carousel or the cubicle to keep the mannequins in the desired

position matching the position of the models when the model photoimages were taken. This is important so that when the photoimage of the mannequin with clothing on it (the as-worn photoimage) is superimposed on the model photoimage, it will match realistically. In addition to using non-original upper and lower portions to create a variety of size combinations, additional members such a hip and breast and hip adjusters can be added to the mannequin. Therefore, by separating and combining various size portions of various mannequins, it is easy to assemble a set of mannequins or to have sufficient mannequin portions to assemble a set of mannequins to represent a wide range of portion sizes for each portion and combine different sizes thereof. In addition, these mannequins or portions of mannequins may be stored.

[0051] Moreover, mannequins assembled with these portions may be dressed with, fitted with a wider variety of types, pieces, cuts, sizes, outfits, combinations, garments, or cuts of clothing such as by having the clothing arranged or conformed onto one or more portions of the mannequin in an as-worn fit, such as a fit that looks as if the clothing were worn by a person having portion sizes or dimensions similar to that of the mannequin. For instance, a first portion of a mannequin (e.g., such as an upper or top half of a mannequin of a human being) may be dressed with a first clothing size first item, and a second portion of the same mannequin (e.g., such as a lower or bottom portion of a mannequin of a human being) may be dressed with a second clothing size second clothing item. Since the first and second portion of the mannequin may have various sizes, combining N sized mannequins having different upper and lower portion sizes from each other leads to N^2 possible combinations of mannequins.

[0052] Thus, a wide range of potential body size types corresponding to the size of the first and second portions may be assembled and photoimages of those body size types may be taken wearing various clothing without having to find a model for each body type. In other words, mannequins can be created having a small, a medium, and a large sized upper and lower portion corresponding the size of a small, medium, and large model. Then the three mannequins can be separated into six upper and lower portions. Those six

portions may then be combined to create nine different shaped mannequins. It should be appreciated that if more than two portions are separated and recombined to form mannequins, such as if M portions are used to form N sized mannequins, the combination of possible mannequins increases to N^M .

[0053] According to embodiments, once a mannequin, such as a mannequin described above having a combination of portions, is dressed a photoimage is taken. For instance, a photoimage of such a mannequin with clothing (e.g., such as clothing having various sizes) in an as-worn fitting (e.g., such as a fitting where the clothing items are arranged on the mannequin to appear as if they were worn by a person having the same sized portions as the mannequin) may be taken and stored or recorded, such as in a digital medium. For example, photoimages of the mannequin wearing the as-worn fit clothing may be taken using carousel 50 and/or cubicle 42 as described above.

[0054] With an inventory of model images and/or photoimages, and of the as-worn photoimages of the clothing on the mannequins (e.g. such as different sized clothing on upper and lower portions), various business services can be offered to customers. For instance, additional model and/or as-worn photoimages can be easily and efficiently created for current or new clothing sellers. Notably, the model photoimage or image database has only to be created once, and the mannequins have only to be created once. Then, as explained herein, any clothing item may be dressed onto a mannequin (which may be a single size or a combination of differently sized upper and lower portions) and as-worn photoimages taken.

[0055] For a particular fashion design a set of as-worn photoimages can be acquired in the range of sizes of clothing items desired to be made available through the system and method. For example, according to embodiments, various digital processing equipment, computers, computer memory, processors (e.g., such as a central processing unit (CPU)) displays, input/output devices (e.g., such as a mouse, a keyboard, a touch screen, voice command, etc.) may be used with the apparatus, systems, and methods described herein to provide users or shoppers with access to the model images and/or as-worn photoimages of the clothing. Thus, a computer component

(e.g., such as a computer memory, processor, display, or other storage device) may include data, a database, or databases to store the model images and/or as-worn clothing photoimages. Specifically, a computer component may have or store a model image database including original or composite model images formed from a plurality of portions of models having different portion sizes, such as described above with respect to **Figures 2 and 3**. In addition, a computer component may include a catalog or images of clothing items such as by including generic photoimages of clothing items from a manufacturer, distributor, store, outlet, or clothing retailer catalog. In addition, a computer component may include an as-worn clothing photoimage database having photoimages of clothing items having various clothing sizes arranged on various portions having various portion sizes of mannequins to provide an as-worn clothing photoimage as described above with respect to **Figures 2 through 4**. Furthermore, the computer component described above may be coupled to a communication component that allows the computer component to be communicated with over a network. Specifically, the communication component may allow the computer component to allow the images and photoimages (e.g., such as the images from the model image database, catalog of images, and as-worn clothing photoimage database) to be transmitted to other computer components via a network interface, an Internet connection, a telecommunication connection, and/or various other hardware or free space data connections or channels.

[0056] Moreover, according to embodiments, the computer component described above may be separated into various computer components and/or exist on various parts or portions of a system. For example, the computer component described above may exist on service provider, user/shopper, and/or seller portions of a system, as described above with respect to **Figure 1**.

[0057] Thus, an as-worn clothing photoimage database may include a series of photoimages taken on the mannequins of a size range of clothing items within a fashion design. Since these photoimages are of clothing items being worn by a mannequin, they become the as-worn photoimages. The clothing seller may provide the clothing items and the database is specific to the seller's catalogue of clothing. These photoimages may be acquired or

processed so that as stored in the memory 16 as a database, no part of the mannequin or background is shown. Instead, only an image of the clothing item in an as-worn configuration is recorded in the database. Like the photoimages of the models, the as-worn photoimages may be a set of progressively rotated stills or maybe digital video images enabled to show a complete rotation around the article of clothing. In other words, the as-worn clothing item database may match the model database.

[0058] As an example, in the case of two-piece outfits, combinations of combinations of separated upper and lower portions of photoimages of models can be combined or morphed into M^N combinations where M is the number of sizes of the different portions of the models separated and combined and N is the number of the portions separated and combined. Thus, the model image database may contain the M^N images. Correspondingly, combinations of M sizes of clothing to fit the N portions of the models can be arranged on mannequins having combinations of the N portions with M sizes to create an as-worn clothing photoimage database having M^N photoimages of the M^N possible mannequins wearing the M^N possible combinations of clothing.

[0059] It is also contemplated that for certain portions, clothing, shoes, accessories, or other exceptions, items may be added to, overlaid over, morphed with, or otherwise combined with the as-worn photoimages (e.g., such as by combining or using image processing as describe above or forming model images with respect to **Figure 2**). For example, a necklace, a bracelet, a choker, pantyhose, shoes, hats, earrings, or other accessories or clothing may be added or combined with the as-worn clothing photoimage database.

[0060] Similarly, according to embodiments of the invention, a composite image may be produced including an image or a portion of an image from the model image database and a photoimage or a portion of a photoimage from the as-worn photoimage database. Thus, such a composite image may include photoimages from the as-worn clothing photoimage database that have portions or clothing that corresponds in size with that of the portions of the image it is combined with from the model image database. Alternatively, in one embodiment, the portions of the as-worn photoimages

(e.g., such as upper and lower portions of two photoimages) can be combined into an as-worn combination (e.g., such as by a computer programmed to combine the upper or lower images using image processing as describe above or forming model images with respect to **Figure 2**). For example a size 4 upper as-worn photoimage could be combined with a size 8 lower as-worn photoimage.

[0061] Embodiments also include a business method where a clothing seller will enter into an agreement with the service provider to have its clothing selections made available for sale through the apparatus, method or system described herein. The photoimages of the models and the as-worn clothing will already have been created as a permanent part of the service provider's capability. Upon agreement with the seller the as-worn clothing photoimage database for the seller's clothing items may be created. Note that it is also considered that the service provider (e.g., such as service provider portion 10 as shown in **Figure 1**) may provide a link or send data to the seller or a vendor site to fulfill purchases of clothing items (e.g., such as by passing a user or shopper to access a website or web pages from seller portion 14, or to pass data thereto such as to ordering element 34 and/or fulfillment element 36, as described above with respect to **Figure 1**).

[0062] As noted above, in one embodiment the photography of models or mannequins may consist of a series or combination of video or still shots of a model or mannequin, front, side, back and other side. Alternatively, video photography can be used with full 360-degree rotation. The still picture procedure and the video process are two separate processes that may or may not be integrated.

[0063] Still photography versions of the as-worn photoimages may image editing to cut the clothing items out of each photoimage to eliminate any portions of the mannequin that are in the photoimage so that the photoimage may be superimposed on an image or photoimage of a matching model or portion thereof. In some variations, the still as-worn photoimage and/or model image arrangement can be given the impression of movement by either of two techniques. In the first technique, between the still positions a small clip

from a video of the model can be inserted, showing the model rotating until the next still photoimage is locked in place. In the second technique, a digital transition is used to show the model rotating from one still position to the next. A blurred illusion can be introduced in either technique to give the impression of movement.

[0064] When a video technique is used to take the as-worn photoimages of the mannequin, the images may be shot in a cubical having a background color that is the same as the color of the mannequin. In addition, the mannequin may be shot against a background having a neutral color or against a "blue screen". This will simplify the editing effort such that the mannequin will not have to be "cut out" from the video after it is shot. Instead, the mannequin and the background will disappear with use of the proper video editing tools, such as Adobe Photoshop® and/or Adobe Premiere®.

[0065] Thus, according to embodiments, it is considered that a combined or composite image may include moving video or a compilation of still images to create a rotating as-worn clothing image combined or superimposed over a rotating model image. For example, still images from the model image database may be overlaid over video of the rotating as-worn clothing image. Also, portions of images from the model image database may be separated (e.g., such as neck, head, feet, and skin not covered by the selected clothing) and combined with still images or video images of as-worn clothing from the as-worn clothing photoimage database. Furthermore, it is contemplated that the combined or composite image may include sections of the model image where clothing does not cover a model image belly, back, neck, shoulders, cleavage, legs, butt, G-string area, chest, arms, and/or legs. Specifically, the composite clothing image may include an image having a head portion, a neck portion, a foot portion of a human model, combined with the as-worn photoimage from the as-worn clothing photoimage database. More particularly, the display may include a photoimage of a neck portion of a mannequin that corresponds to the neck size of the model image.

[0066] As noted above, one way to do this is with editing software that will overlay the clothing item imagery onto the model video and merge them

into a single video. For example, according to embodiments, the model image database and/or the as-worn photoimage database (e.g., of the seller's clothing items as worn on the combined portion mannequins) may reside in the service provider's system (e.g., such as service provider portion 10 of **Figure 1**). It is also contemplated that the model image database and/or as-worn photoimage database may be implemented in the seller's system (e.g., such as seller portion 14 as shown in **Figure 1**) such as by downloading either or both of the database from a data source or data sources (e.g., such as by downloading from service provider portion 10).

[0067] Communication by users or shoppers may be provided to the service provider, such as in the form of an on-line internet connection to the shopper's computer equipped with a graphical shopper interface and a display. Alternatively, communication by a user or shopper may be provided in a form of a network, online Internet, or local connection to the seller's computer equipment (e.g., such as described above with respect to seller portion 14 for a clothing retailer outlet or seller). For example, **Figure 5** is a flow chart of a process for a user or shopper to use the system and access displays of as-worn clothing. A user or shopper sets up a relationship with the service provider similar to the relationship now commonly used between individuals and providers of services or goods over the internet. For example, a shopper will register with the service provider by a shopper ID and a password to allow entry to the system. In addition, a user or shopper may be prompted for or may register with a name, address, phone number, hint question, and hint answer.

[0068] At block 71, the user or shopper is prompted for or inputs physical data, such as physical data relevant to clothing fit. Specifically, such physical data may include or correspond to sizes of features or portions of a person as described above with respect to sizes of portions or features of a model considered for the model image database, as described above with respect to **Figures 2 and 3**. Thus, the system may display to a user or shopper a screen including fields for entering physical data such as clothing sizes and body measurements, or to designate the use of previously entered physical data relevant to clothing fit. It is also contemplated that such as screen may include a graphic of a body, such as to display a portion or image from the

model image database having portions with sizes corresponding to the data being entered by the user or shopper. Specifically, either initially or at any time the shopper will enter the desired personnel clothing information. This may be in the form of the shopper's or user's desired personal physical dimensions either of the shopper personally or of some other person for whom the shopper is shopping. The dimensions may be either limited to or converted to conventional size designations or the system software may be created to accept and process more specific personal physical dimension data.

[0069] A shopper who uses or subscribes to the service can designate one or several sets of size and other information for one or several different people (e.g., such as to correspond to sizes of portions of models, mannequins, and clothing in the model and as-worn clothing database). The service provider will retain all the data sets as designated allowing the shopper to make visits to the service site whenever desired. New designations can be added and all data can be changed by the shopper. In any case the information entered may be used to select a model image which may be a complete original photoimage, or a combination of separate portions of model images.

[0070] In addition, according to embodiments, a person's physical data may include data related to or identifying features of face, hair, hands, feet, skin, etc. as described above with respect to **Figure 2** and features and portions of a model considered in forming images for a model image database. Moreover, it is contemplated that a digital photo flip book or other feature combining technology or display may be used to assist a user or shopper in selecting appropriate portions or features, such as for a head, neck, hands, feet, arms, and/or legs. For example, block 71 may include a face/head selection process or interface using a digital photo flip book to find a face and/or hair match for a person considering eye color, hair color, skin color, hair style, and head shape. Thus, any of the features may be altered or flip book pages may be scrolled through to display images of faces having various features as described above from a database.

[0071] At block 72, the user or shopper may be presented with the completed or partially completed model image from the model image database

that corresponds with the physical data, selections, and/or features entered or selected by the user or shopper. For example, the model image may be a combined model photoimage combining portions of models having various sizes, a neck, face, feet, hands, arms, and/or legs according to physical data input by the user or as selected by the user or shopper. At block 73, catalog clothing items may be viewed by the user. For example, a catalog of clothing fashions which is stored in a clothing database may be displayed to the user from which to select a clothing item to be displayed on the model image displayed at block 72. A selection procedure may be used by the shopper to choose a catalogue of clothing to be presented. This presentation can be a conventional catalogue image of the clothing. Thus, the system may prompt, respond to, and/or allow a user to select (e.g., such as over a network using a network interface or locally) to obtain all or portions of a generic clothing image catalog and select items therefrom such as to be placed in a dressing or fitting room from which items will be selected to be viewed as-worn on the model image.

[0072] At block 75, the user or shopper may select one or more clothing items to be displayed in an as-worn fashion, as if the items were worn by the model image displayed at block 72. For example, at block 75, a user may select a clothing item from the catalog viewed at block 73 and upon selection an as-worn photoimage of that clothing item may be combined into a combined image with the model image from block 72 and displayed such that the clothing item selected has a clothing size based on the physical data designated by the shopper which also corresponds to the portion sizes of the model image of block 72 and the portion sizes of the mannequin on which the clothing in the as-worn photoimage was arranged. Thus, when the user or shopper is prompted to select a clothing item from the catalog to be shown as-worn on the model image, the user may select items from a catalog or items from a selected group of items pre-selected from a catalog (e.g., such as by dragging and dropping one or more items of clothing from a catalog of items or from a selected group of items from a catalog of clothing items) and the model image will appear to be dressed with those selected clothing items (e.g., such as in a composite or combined image or photoimage as described above including a model image or sections thereof and an as-worn photoimage of the clothing).

[0073] At block 76, a composite clothing image of the selected clothing items as-worn by the model image is displayed. For example, the composite clothing image may include at least one section of the model image matching the entered or selected person's physical data relevant to clothing fit from block 71 and may include at least one clothing item in an as-worn photoimage of the clothing item worn by a portion of a mannequin where the clothing item selected has a clothing size matching a person's physical data relevant to clothing fit input at block 71 as well.

[0074] According to embodiments, block 76 may also include displaying a photoimage or including a photoimage of a third item such as accessories or shoes such as is described above for generating as-worn photoimages for the as-worn clothing photoimage database. For instance, as describe above, the composite image may include sections of the model image where clothing does not cover the model. Specifically, displaying the composite clothing image of block 76 may include an image having a head portion, a neck portion, a foot portion of a human model, such as from the model image at block 72, combined with the as-worn photoimage from the as-worn clothing photoimage database. The display may include a photoimage of a neck portion of a mannequin or model having a neck size corresponding to the neck or physical data input at block 71.

[0075] Additionally, according to embodiments, the displayed composite clothing image at block 76 may be a 3-dimensional (3D) image, such as is described above with respect to combining images from the model image database and images from the as-worn clothing photoimage database. Similarly, the displayed composite clothing image at block 76 may be rotated to provide a view of the composite clothing image from various angles within a 360° radius. In addition, according to embodiments, the display of the composite clothing image at block 76 may include a portion or a display of the image from a 180° mirror display orientation with respect to the orientation shown by the image displayed on the screen. For example, a location of the screen may be identified to provide a "mirror" image showing the opposite view of the 3-dimensional image. Next, as described above, with respect to

Figure 4, the composite clothing image displayed at block 76 may include a video or image made to look as if it is moving or walking.

[0076] At block 78, the composite clothing image may be cleared, selected clothing items may be purchased, and/or selected clothing items may be updated in the composite clothing image. For example, from block 78, the process may return to any of blocks 70, 71, 72, 73, or 75. Alternatively, block 78 may include purchasing one or more clothing items, such as items selected to be displayed in the composite clothing image.

[0077] According to one embodiment, a split screen will allow the shopper to select from the clothing catalogue an item of interest to be combined with the model image. On one side of the screen is a photoimage of the selected model, selected from the model database that matches the shopper's physical dimensions as closely as the system is designed to allow. This image is unclothed (as much as is acceptable) and rotatable. Assuming the full video imagery has been stored, it can be rotated by increments or by continuous rotation upon selection by the shopper. On the other side of the screen the clothing catalogue or selected items from a catalog are shown (e.g., such as where the split screen is a dressing room or fitting room for showing what items selected from a catalog will look like on the model image). The image of each item of clothing in the catalogue need not be specific to any particular shopper and may be a typical promotional image (e.g., such as a two dimensional, unisized image) of the clothing item. The shopper is then enabled to place the item of clothing onto the model image, for example, by click-and-drag or by double click, using a mouse; or keyboard strokes may be made available to put a cursor on an item and move it. After the click-and-drag or similar operation to move the clothing item from the catalogue onto the model image, the clothing item image as shown on the model image will not be the one from the catalogue, but rather it will be selected from the as-worn clothing item photoimage database. The as-worn photoimage of the clothing item will be selected that most closely matches the shopper's personal data and similarly will match the model image that has already been selected to match the shopper's personal data (e.g., such as is described above with respect to **Figures 3 and 4**).

[0078] For instance, **Figure 6** shows a screen to display to a user or shopper a fitting room interface to selecting clothing items to be displayed as-worn, and to view combined or composite clothing images. As shown in **Figure 6**, fitting room interface screen 80 having model image 82, clothing catalog 84, clothing catalog rotation buttons 85, and model image rotation buttons 89. Clothing catalog 84 is shown having various catalog clothing items for selected to be dragged and dropped to be shown as-worn on model image 82. For example, clothing catalog 84 includes dress 86, pants 87, and shirt 88. Thus, a user or shopper may select, such as via a mouse, keyboard, touch screen, verbal, or other interface to rotate clothing catalog 84 via rotation buttons 85 to rotate model image 82 via rotation buttons 89 or to be displayed dress 86, pants 87, and/or shirt 88 on model image 82 in a composite clothing image of the selected clothing item or items to look as-worn by the model image. More particularly, although dress 86, pants 87, and shirt 88 may be shown as a single size, 2-dimensional, or catalog image at clothing catalog 84, one of those items is dragged and dropped onto model 82 that image will be displayed as an as-worn clothing photoimage (e.g., such as a 3-dimensional image viewable by rotating model 82 using rotate buttons 89) as worn on model 82 as described herein.

[0079] According to embodiments, the items on clothing catalog 84 may previously have been selected from a prior clothing catalog such as described above with respect to blocks 73 and 75 of **Figure 5**. Thus, screen 80 may also include a selection to return to the larger clothing catalog item selection screen and/or a menu selection to purchase items shown as worn on model 82 or from clothing catalog 84.

[0080] It is also considered that the system, prompts, displays, and selections described herein (e.g., such as above with respect to **Figures 5 and 6**) may be configured so that a user or shopper is unaware as to whether the user is interacting with a local or remote system (e.g., such as a remote computer or server over a network of the Internet). Thus, the user or shopper is unaware as to whether or not they are communicating with, being prompted by, selecting from, or being displayed data or images from the service provider, user/shopper computer, or from the seller (e.g., such as service provider

portion 10, user/shopper portion 12, and/or seller portion 14 as described above with respect to **Figure 1**, or other configurations of computer components as described herein).

[0081] Hence, as described herein, a user or shopper will be able to view the clothing item on a photoimage in as-worn appearance, closely matching the shopper's or another person's own physical dimensions and on a model that similarly matches. The user or shopper can rotate the photoimage with the clothing item as worn either by increments or continuously, can see how the item would look on a person of the dimensions or size that has been entered, and can elect to buy the item. Purchase screens can be adapted to implement the purchase such as the use of shopping carts to store selections, a review screen to review the shopping cart contents, and finally a purchase order screen with entry of payment data such as credit card information and shipping destination data. For instance, in an embodiment, when the shopper initially elects to make a purchase the communication system connects the shopper directly to the clothing seller's computer system for execution of the purchase. This switch may be done so that the shopper is not aware that a different communication channel has been established.

[0082] In the foregoing specification, specific embodiments are described. However, various modifications and changes may be made thereto without departing from the broader spirit and scope of embodiments as set forth in the claims. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense.